
Compliance Summary

Introduction

During 1996, Lawrence Livermore National Laboratory (LLNL) participated in numerous activities to comply with federal, state, and local environmental regulations as well as internal requirements and Department of Energy (DOE) Orders. Activities related to air, water, waste, waste reduction, community “right to know,” and other environmental issues were carried out at the Livermore site and Site 300. Many documents concerned with these activities and other environmental issues are available for public viewing at the LLNL Visitors Center and the Livermore and Tracy Public Libraries. A wide range of compliance activities are summarized in the following sections. A significant achievement in 1996 was EPA’s awarding to LLNL a National First Place Award in the industrial category for its excellent storm water management program.

CERCLA/SARA, Title I

LLNL has two projects that are under the jurisdiction of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/ Superfund Amendment and Reauthorization Act (SARA), Title 1. These are the Livermore Site Ground Water Project and the Site 300 Environmental Restoration Program.

Livermore Site Ground Water Project

The Ground Water Project (GWP) complies with provisions specified in a federal facility agreement (FFA) entered into by the Environmental Protection Agency (EPA), DOE, the California EPA’s Department of Toxic Substances Control (DTSC), and the San Francisco Bay Regional Water Quality Control Board. As required by the agreement, the project addresses compliance issues through investigations of potential contamination source areas (such as suspected old release sites, solvent handling areas, and leaking underground tank systems), continued monitoring of ground water, and remediation. The ground water constituents of concern are volatile organic compounds (VOCs), primarily trichloroethylene (TCE) and tetrachloroethylene (PCE). These contaminants are present primarily within the site boundary but to some extent at the site boundary and beyond, mainly to the west and south of the site. Treatment facilities are generally situated in areas of high concentrations of VOCs (see **Figure 2-1**). However, Treatment Facilities A and B (TFA and TFB) are located at areas of lower contaminant concentrations downgradient from high concentration “hot spots” to aid in remediation of contaminated ground water at and beyond the site boundary.



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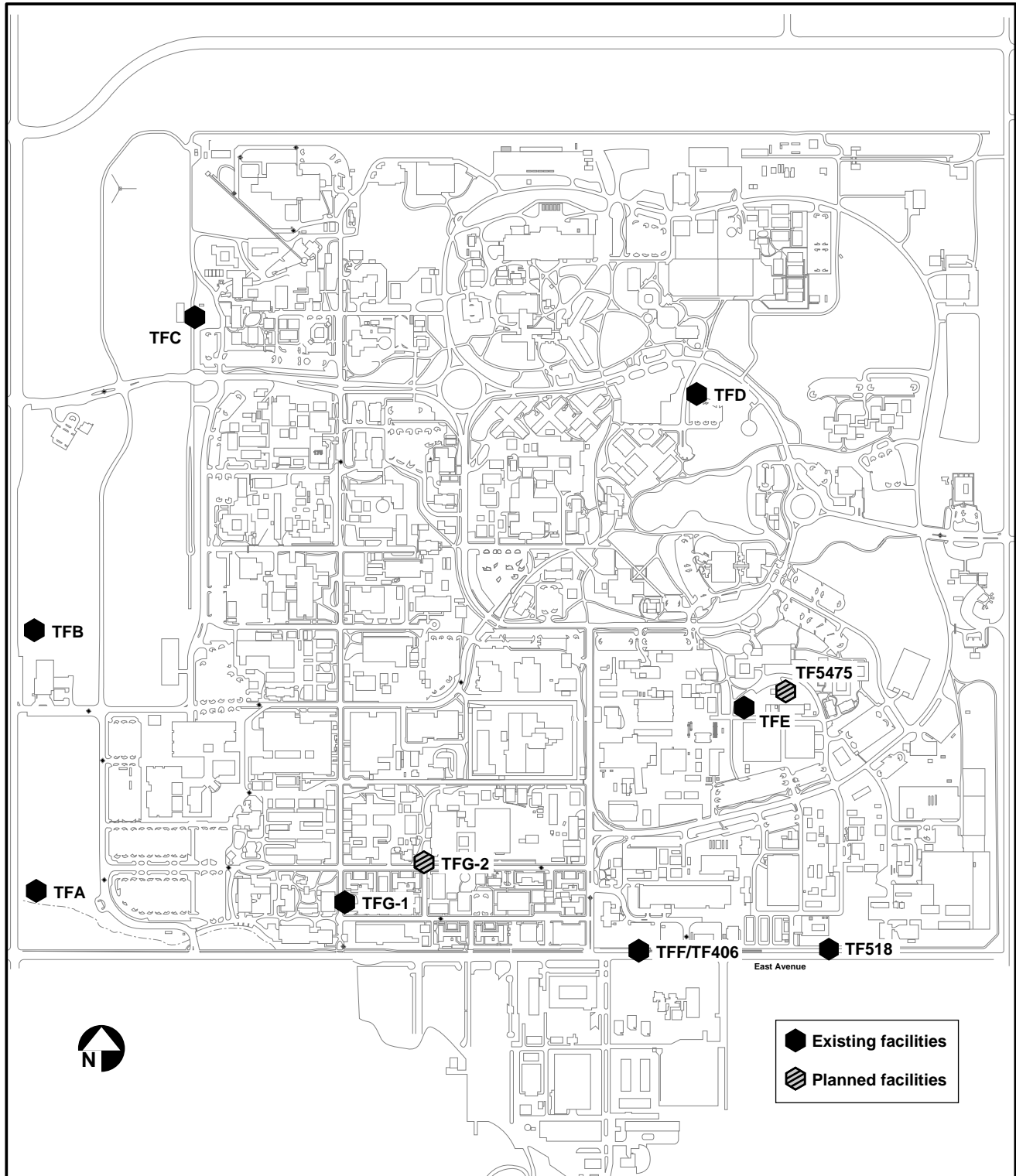


Figure 2-1. Location of existing and planned ground water treatment facilities.



The primary treatment technology employed at the Livermore site to remediate contaminated ground water is ground water pump-and-treat. This technology employs a dense network of ground water extraction wells, monitoring wells, pipelines, and surface treatment facilities.

Documentation

During 1996, DOE/LLNL issued two final CERCLA documents for the Livermore site according to the amended schedule in the Remedial Action Implementation Plan (RAIP) (Dresen et al. 1993). The Compliance Monitoring Plan (Nichols et al. 1996) was issued on January 25, 1996, and the Contingency Plan (McKereghan et al. 1996) was issued on November 15, 1996.

As required by the Federal Facility Agreement, DOE/LLNL issued the *LLNL Ground Water Project, 1995 Annual Report* (Bainer et al. 1996). DOE/LLNL also submitted summaries of 10 Remedial Project Managers' Meetings; the March (McConachie and Brown 1996), July (Ko and Lamarre 1996), September (Littlejohn and Lamarre 1996), and December (Littlejohn and Lamarre 1997) summaries included quarterly self-monitoring data.

Milestones and Activities

All seven of the milestones set out in the amended 1996 RAIP (Dresen et al. 1993) for the Livermore site were reached. In addition to RAIP milestones, DOE/LLNL conducted source investigations at Treatment Facility G1 (TFG1) and completed and activated the Treatment Facility C (TFC) North Pipeline on September 26, 1996. (See **Figure 2-1** for locations of treatment facilities at the Livermore site.) Ground water remediation activities at the Livermore site are summarized in **Table 2-1** and discussed in greater detail in Chapters 7 and 8.

Ground Water Project activities in 1996 also included the following:

- Negotiated the Bay Area Air Quality Management District permit conditions for portable treatment units (PTUs). (See description of PTUs later in this chapter.)
- Revised LLNL's *Environmental Project Standard Operating Procedures* (Dibley and Depue 1996).
- Received regulatory approval to modify treatment facility effluent discharge limits for metals and sampling frequencies (Bessette Rochette 1996).



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- Received regulatory approval on an outline for the *Five-Year Review*, due August 5, 1997 (Littlejohn and Lamarre 1996).
- Submitted *Application for Containment Zone for the Livermore Site Hydrocarbon Impacted Zone at Treatment Facility F* (Happel et al. 1996) on July 17, 1996, and received regulatory approval for “No Further Action” for the fuel hydrocarbons on October 30, 1996 (San Francisco Bay RWQCB 1996).
- Issued the report *Simulation of Soil Vapor Extraction at Building 518* (Vogele et al. 1996) to the regulatory agencies.
- Agreed to a revised Livermore Site Consensus Statement/Priority List and the RAIP schedule on September 19, 1996 (Ko et al. 1996).

In addition, DOE and LLNL started to prepare two Explanation of Significant Differences reports for changes to the remedial action plan described in the *Record of Decision* (U.S. Department of Energy 1992). One request is for a change to air stripping only at TFA and TFB, and the other is for changes in the metals discharge limits. A revised *Site Safety Plan* is also being prepared.

Table 2-1. Volatile organic compounds (VOCs) removed from ground water at the Livermore site.

Treatment facility	Startup date	1996		Cumulative totals	
		Water treated (ML) ^(a)	VOCs removed (kg)	Water treated (ML) ^(a)	VOCs removed (kg)
TFA	9/89	348	16.8	992	75
TFB	10/90	57	7.7	182	20
TFC	10/93	17	2.4	49	6
TFD	9/94	41	12	49	18
TFE	11/96	1.9	0.8	1.9	0.8
TFF ^(b)	—	—	—	—	—
TFG1	4/96	3.4	0.2	3.4	0.2
TF406	8/96	1.5	0.2	1.5	0.2
TF518 ^(c)	9/95	—	42	—	66

^a ML = 1 million liters.

^b In June, water was extracted for 6 hours to evaluate concentrations of fuel hydrocarbons in ground water. Further treatment was deemed unnecessary. Ground water extraction and treatment were discontinued.

^c Volatile extraction well only—no water was extracted during 1996.



Portable Treatment Units. Portable treatment units (PTUs) are used as part of LLNL's strategy for optimizing its environmental restoration program. These relatively inexpensive, units provide an alternative to fixed ground water treatment facilities, and are used for hydraulic testing and contaminant mass removal throughout the Livermore site. PTUs are planned for future use at Site 300. An entire PTU, including particulate filters, an air stripper for removing VOCs from ground water, a granular activated carbon canister for removing VOCs from the air stream produced by the air stripper, and ion-exchange resin for removing metals is contained in a 20-ft cargo container. PTUs can be easily moved to the appropriate extraction wells to optimize contaminant mass removal. Because PTUs use the same treatment technologies as fixed facilities, and can remediate ground water faster and more cost-effectively, the regulatory agencies are receptive to their use.

Passive Bioremediation in TFF. In 1996, the feasibility of using passive bioremediation in the TFF area was demonstrated to the satisfaction of the regulating agencies. Ground water extraction and treatment for residual dissolved fuel hydrocarbons from hydrostratigraphic units 3A and 3B were permanently discontinued. Before its permanent shutdown, TFF operation was interrupted for 194 days as a result of storm damage that occurred on December 8, 1995. During June 1996, ground water was extracted and treated at TFF for a total of 6 hours to evaluate fuel hydrocarbon (FHC) concentrations in ground water extracted from hydrostratigraphic unit (HSU) 3B well GEW-816. No rebound of FHC concentrations was observed in ground water from GEW-816. Following submittal of *Application for Containment Zone for the Livermore Site Hydrocarbon Impacted Zone at Treatment Facility F* (Happel et al. 1996), "No Further Action" status was granted by the regulatory agencies on October 30, 1996 (San Francisco Bay RWQCB 1996). As part of the terms of this agreement, wells in this area will be sampled and analyzed for FHCs on a semiannual basis.

Community Relations

The Community Work Group (CWG) met twice in 1996 to discuss cleanup progress, DOE budget issues, evaluation of new technologies, the Priority List-Consensus Statement, and the Contingency Plan. Correspondence and communication with CWG members continued throughout the year.

Other Livermore site community relations activities in 1996 included communicating and meeting with local interest groups and other community organizations; giving public presentations, including those to local realtors and international student and business groups; producing and distributing the *Environmental Community Letter*; maintaining the Information Repositories and the Administrative Record; conducting tours of the site environmental activities; organizing a Treatment Facility G1 (TFG1) ribbon cutting ceremony; and responding to public and news media inquiries. DOE/LLNL also began meeting with members of Tri-Valley Citizens Against a



Radioactive Environment (CAREs) and their technical advisor prior to the renewal of their EPA Technical Assistance Grant.

Site 300 Environmental Restoration Program

At Site 300, remedial investigations, feasibility studies, engineering evaluation and cost analyses, and remedial actions are ongoing. Site 300 investigations and remedial actions are conducted under the joint oversight of the EPA, Central Valley RWQCB, and DTSC and the authority of an FFA for the site (there are separate agreements for Site 300 and the Livermore site). During November 1996, an addendum containing updated scope and milestone due dates was added to the FFA after approval by the regulatory agencies (U.S. Department of Energy 1996a). The study areas and major constituents of concern at Site 300 are shown in **Figure 2-2** and **Table 2-2**.

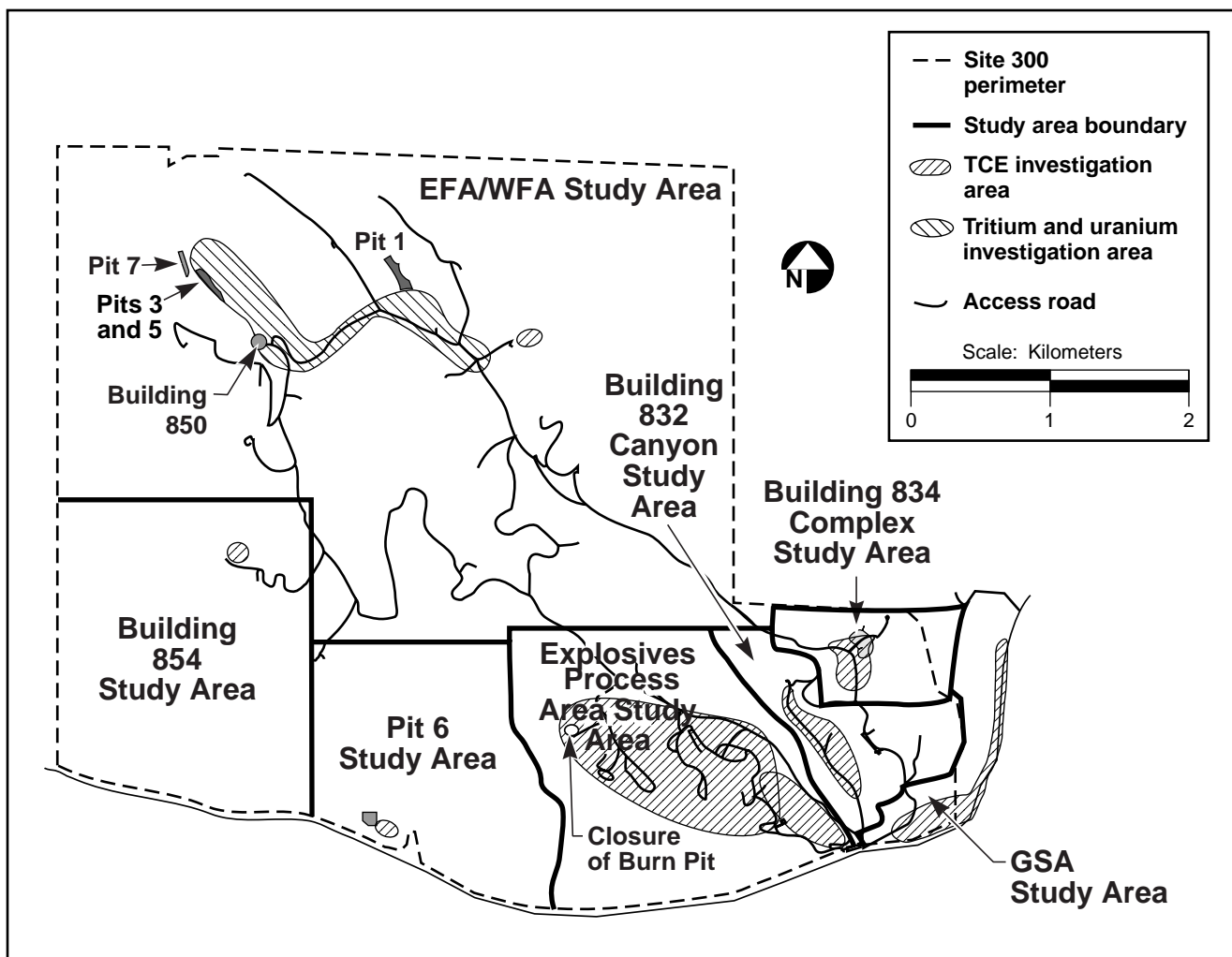


Figure 2-2. Environmental restoration study areas and activities at Site 300.



Table 2-2. Major constituents of concern found in soil, rock, and ground water at Site 300.

Study area	Constituent of concern
General Services Area (GSA)	VOCs (primarily TCE)
Building 834 Complex	TCE
Explosives Process Area	VOCs (primarily TCE) HE ^(a) (primarily HMX and RDX)
East and West Firing Areas (EFA/WFA)	Tritium Depleted uranium VOCs (primarily TCE)
Building 854	VOCs (primarily TCE)
Pit 6	VOCs (primarily TCE)
Building 832 Canyon	TCE

^a HE = high explosives.
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine.

Table 2-3. Volatile organic compounds (VOCs) removed from ground water and soil at Site 300.

Treatment area	Startup date	1996		Cumulative totals	
		Water treated (ML) ^(a)	VOCs removed (kg)	Water treated (ML) ^(a)	VOCs removed (kg)
General Services					
Eastern GWTF ^(b)	6/91	49.7	0.34	313	4.6
Central GWTF	4/93	0.8	1.18	2.6	4.5
Building 834	10/95	0.16	10.7	0.17	11.5
		Soil vapor treated (m ³)	VOCs removed (kg)	Soil vapor treated (m ³)	VOCs removed (kg)
General Services					
Central	1994	226,038	5	398,697	29.6

^a ML = million liters.

^b GWTF = ground water treatment facility.



During 1996, LLNL submitted all regulatory documents and performed all actions stipulated in the FFA on schedule. **Table 2-3** summarizes remediation activities at Site 300.

Documentation

During 1996, LLNL submitted the following documents pertaining to the Site 300 Environmental Restoration Program to the regulatory agencies:

- *Addendum to the Site-Wide Remedial Investigation Report, Building 850/Pit 7 Complex Operable Unit* (Taffet et al. 1996).
- “Tritium Geochemistry and Ground Water Treatment Technology for the Building 850/Pit 7 Complex Operable Unit letter report” (LLNL 1996a).
- *Draft Final and Final Proposed Plan for the General Services Area* (LLNL 1996b and c).
- *Draft and Draft Final Record of Decision for the Site 300 General Services Area* (LLNL 1996d and e).
- *Pit 6 EE/CA Fact Sheet* (LLNL 1996f).
- *Addendum to the Pit 6 Engineering Evaluation/Cost Analysis, Lawrence Livermore National Laboratory Site 300* (Berry 1996).
- “Addendum 2 to the Site 300 Federal Facility Agreement and Appendix A: FFA Schedule of Deliverables” letter (U.S. Department of Energy 1996a).

Activities

Background for LLNL activities at the following locations can be found in previous Environmental Reports (Harrach et al. 1996 and 1995) and the *Final Site-Wide Remedial Investigation Report, Lawrence Livermore National Laboratory Site 300* (Webster-Scholten 1994).

General Services Area. In 1996, the air-sparging treatment system used to treat ground water in the eastern GSA was replaced by aqueous-phase carbon adsorption treatment units. The aqueous-phase carbon adsorption units were demonstrated to be effective in removing VOCs from ground water, less complex in both design and operation than air-sparging technology, and less expensive. Before cleanup was initiated, the VOC plume extended about 1200 m off site; it now extends only 300 m off site. LLNL estimates that 9 more years of ground water extraction and treatment will be required to achieve and



maintain ground water VOC concentrations below maximum contaminant levels (MCLs) at the eastern GSA.

During 1996, VOCs were removed from extracted soil vapor at the central GSA. An estimated additional 9 years of soil vapor extraction and 54 years of ground water extraction are required to achieve and maintain ground water VOC concentrations below MCLs at the central GSA.

Details of 1996 activities are contained in the following reports: *Draft Final Proposed Plan for Remediation of the Lawrence Livermore National Laboratory Site 300 General Services Plan* (Landgraf and Rueth 1996a and b), *Draft Record of Decision for the General Services Area Operable Unit, Lawrence Livermore National Laboratory Site 300* (Rueth and Ziagos 1996), and *Draft Proposed Plan for the General Services Area Operable Unit, Lawrence Livermore National Laboratory Site 300* (LLNL 1995).

Building 834 Complex. The extraction system underwent extensive expansion and upgrading during 1996. Nine additional wells were plumbed into the manifold, bringing the total number of extraction wells to 15. A number of engineering modifications were implemented to simplify management of off-gas scrubbing and associated monitoring. A sheltering roof was erected over the treatment apparatus, which allows diversion of rainwater away from the area of highest subsurface contamination, greatly reducing recharge in that area. An economical plan was also developed for further drainage improvements and road surface repairs to further reduce recharge into the contaminated area. (See Chapter 8 for a more complete discussion of 1996 monitoring activities at the Building 834 Complex.)

Explosives Process Area. Continued assessment of chemical data indicated that although natural attenuation is reducing the extent and maximum concentration of VOCs at the Building 815 operating unit, contaminants continue to migrate towards the Site 300 boundary. During 1996, the regulatory agencies agreed that the CERCLA pathway for the Building 815 operating unit was a removal action, and thus work began on the engineering evaluation/cost analysis (EE/CA) report for the Building 815 operating unit. The removal action strategy to be evaluated in this report is plume control using ground water pumping and treatment with granular activated carbon. (See Chapter 8 for a more complete discussion of 1996 monitoring activities at the Explosives Process Area.)

East and West Firing Area Study Area. Indications are that at Building 850, tritium was released to the subsurface by percolation of rainfall runoff and dust-control water through contaminated Building 850 firing-table gravels to ground water (Taffet et al. 1989b, Taffet et al. 1996). In the Pits 3 and 5 areas, tritium was released to ground water



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from Pits 3 and 5 by heavy winter rains in 1982–1983, 1986–1987, 1991–1992, 1993–1994, and 1995–1996, and by the resulting rising water tables. Conservative computer modeling of the fate and transport of the tritium indicates that by the time the tritiated ground water reaches the Site 300 boundary, the tritium will have decayed to near background activity levels.

During 1996, total uranium activities in excess of the California MCL of 0.74 Bq/mL (20 pCi/L) continued to be measured in ground water samples from several monitoring wells at the Pits 3 and 5 areas; several of these wells also yielded water samples bearing isotopic ratios indicative of depleted uranium. Conversely, samples of ground water from several wells in the area contain uranium activities that exceed the state MCL but bear natural-uranium isotopic signatures. Analyses of ground water samples from several wells adjacent to Building 850 also indicate depleted-uranium signatures; these samples do not exceed the California MCL for uranium. Additional field work was conducted during 1996. As a result, we have defined three small plumes of uranium in ground water that emanate from each of Pits 5 and 7 and the Building 850 firing table. Conservative ground water fate and transport modeling indicates that total uranium activity will be at background levels by the time any depleted-uranium-bearing ground water reaches the Site 300 boundary.

Small contaminant plumes exist in other portions of the study area. TCE occurs in a small ground water plume below MCL concentrations at the Building 801 firing table. Freon 113 at ground water concentrations significantly below the California MCL of 1.2 ppm is present near Pit 1 and is the result of spills at Building 865 (Advanced Testing Accelerator). Characterization plans for the Building 812 firing table and the Sandia Test Site portions of the East and West Firing Areas were submitted to the regulatory agencies during 1994. Remedial investigations for these areas and Building 865 are planned for 1998 and 1999.

See Chapter 8 for an expanded discussion of 1996 monitoring in this area.

Building 854 Study Area. By the end of 1996, 11 wells had been completed in the Building 854 area, and 35 boreholes had been drilled for soil, rock, and soil vapor sampling and analysis. Air samples were also collected and analyzed for VOCs. Maximum concentrations of TCE in ground water are on the order of several hundred parts per billion.

Pit 6 Area. The source of the TCE plume is the southeast corner of the Pit 6 landfill. Because of natural volatilization of affected ground water at the springs, concentrations of VOCs in the plume have declined more than an order of magnitude since 1992. *The Final Feasibility Study Report for the Pit 6 Operable Unit* (Devany et al. 1994) discusses



options for remediation in this area. The regulatory agencies agreed to accept this document as an EE/CA report for a removal action. The *Addendum to the Pit 6 Engineering Evaluation/Cost Analysis, Lawrence Livermore National Laboratory Site 300* (Berry 1996) was submitted to the regulatory agencies in 1996. The addendum presents revisions to the accepted capping removal action, which include installation of an impermeable cover, a surface drainage diversion system, and several additional monitoring wells. Title I design began on June 12, 1996. The *Pit 6 EE/CA Fact Sheet* (LLNL 1996f) was issued on December 17, 1996. The Title II design package was submitted to the regulatory agencies on December 18, 1996. A public meeting was held on January 15, 1997. The removal action construction is scheduled for completion by December 1, 1997.

Building 832 Canyon Study Area. Characterization tasks in 1996 included drilling 34 boreholes, installing 17 ground water monitor wells and 4 soil vapor monitoring wells, and collecting and analyzing soil vapor, air, surface soil, and surface water samples. Ground water samples contained TCE and nitrates at concentrations in excess of MCLs. The maximum concentration of TCE reported in ground water was 7 ppm. Samples of surface water and water from shallow wells indicate that a plume of TCE in ground water has reached the southern Site 300 boundary.

Community Relations

The Site 300 CERCLA project maintains proactive communication with the surrounding communities of Tracy and Livermore. Community relations activities conducted during 1996 included continued dialogue with Tri-Valley CAREs, maintenance of the information repositories and administrative records, Site 300 tours for scientists and students from universities and local public schools, support for off-site, private well-sampling activities, and preparation of *Site 300 Fact Sheet Number 3* (Heffner 1996).

A Public Meeting on April 24, 1996, provided a forum for public comment on the planned remedial strategy (continued pump-and-treat) for the General Services Area.

SARA, Title III

Title III of the Superfund Amendment and Reauthorization Act (SARA) of 1986 is known as the Emergency Planning and Community Right-to-Know Act (EPCRA). It requires owners or operators of facilities that have certain hazardous chemicals on site to provide information on the release, storage, and use of those chemicals to organizations responsible for emergency response planning. Executive Order 12856, signed by



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President Clinton on August 3, 1993, directs all federal agencies to comply with the requirements of EPCRA, including the SARA 313 Toxic Release Inventory Program.

EPCRA requirements and LLNL compliance are summarized in **Table 2-4**. **Tables 2-5** and **2-6** identify those chemicals reported by LLNL for the Livermore site and Site 300 under Section 311 during 1996.

Table 2-4. Summary of LLNL compliance with EPCRA in 1996.

EPCRA requirement	Brief description	Compliance
302 Planning notification	Operator must notify SERC ^(a) of presence of extremely hazardous substance.	In California, operator must notify CEPRC ^(b) of presence of extremely hazardous substances above threshold planning quantities. Originally submitted 5/87.
303 Planning notification	Operator must designate a facility representative to serve as emergency response coordinator.	Updates submitted 1/12 and 8/12.
304 Release notification	Releases of certain hazardous substances must be reported to SERC and LEPC ^(c)	No EPCRA-listed extremely hazardous substances were released above reportable quantities.
311 MSDS/Chem inventory	Operator must submit MSDSs or chemical list to SERC, LEPC, and fire department.	Tables 2-5 and 2-6.
312 MSDS/Chem inventory	Operator must submit hazardous chemical inventory to appropriate county.	Business Plans and chemical inventory submitted to San Joaquin County (1/8) and Alameda County (9/12).
313 Toxic Release Inventory	Operator must submit Form R to EPA and state for toxic chemicals released.	Form R for Freon 113 submitted 7/12 to DOE; DOE forwarded to EPA and state on 7/31.

^a State Emergency Response Commission.

^b Chemical Emergency Planning and Response Commission.

^c Local Emergency Planning Committee.

Activities Requiring Permits

Permits are required for a number of LLNL environmental activities related to air, water, hazardous waste, sewerable waste, storage tanks, and medical waste. **Table 2-7** summarizes these permits. Inspections by the permitting agencies in 1996 are summarized in **Table 2-8**.

**Table 2-5.** Livermore site, SARA, Title III, Section 311, Chemical List.

Livermore site chemicals	Physical hazards			Health hazards	
	Fire	Pressure	Reactivity	Acute	Chronic
Argon		X		X	
Carbon monoxide		X		X	
Diesel fuel	X				
Ethylene glycol				X	
Freon 11				X	
Freon 12				X	
Freon 113				X	
Gasoline	X			X	X
Helium		X		X	
Hydrofluoric acid		Some containers	X	X	X
Hydrogen peroxide (>52%)			X		
Lead (bricks and ingots)				X	X
Nitric acid	X		X	X	X
Nitric oxide		X	X	X	
Nitrogen		X		X	
Oxygen		X	X		
Paint	X				
Phosphorous pentoxide ^(a)			X	X	
Propane	X				
Sodium hypochlorite/bleach				X	X
Stoddard solvent/thinner	X			X	
Sulfuric acid			X	X	X

^a Phosphorous pentoxide is no longer listed as an extremely hazardous substance (EHS) under SARA Title III regulations.

Table 2-6. Site 300, SARA, Title III, Section 311, Chemical List.

Site 300 chemicals	Physical hazards			Health hazards	
	Fire	Pressure	Reactivity	Acute	Chronic
Chlorine		X		X	
Bis (2,2-dinitro-2-fluoroethyl) formal in methylene chloride	— ^(a)		— ^(a)	X	X
Diesel fuel	X				
Gasoline	X			X	X
High explosives			X		
Lead (bricks)				X	X

^a Dangerous fire or explosion risk in neat form (solvent evaporates).



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Table 2-7. Summary of permits.^(a)

Type of permit	Livermore site	Site 300
Air	194 permits from BAAQMD. Various equipment, including boilers, emergency generators, cold cleaners, ultrasonic cleaners, degreasers, printing press operation, manual wipe cleaning operations, metal machining and finishing operations, silk screening operation, silk screen washers, paint spray booths, adhesives operations, diamond turning machine cleaning operation, image tube fabrication, optic coating operations, gravity retort, storage tanks containing volatile organic compounds (VOCs) in excess of 10%, planetary mixers, plating tanks, drum crusher, semiconductor operations, diesel air compressor engines, ground water air strippers, soil vapor extraction unit, dryers, ovens, material handling equipment, sewer diversion system, wave soldering machine, oil and water separator, fire test cells, oil shale hopper and preheater, oil shale combustor, gasoline dispensing operation, resin mixing operation, paper pulverizer system, and firing tanks.	43 permits from SJVUAPCD. Various equipment, including boilers, emergency generators, paint spray booth, ground water air strippers, soil vapor extraction units, woodworking cyclone, gasoline dispensing operation, and drying ovens.
Water	<p>WDR Order No. 88-075 for discharges of treated ground water from TFA to percolation pits and recharge basin.</p> <p>WDR Order No. 95-174, NPDES Permit No. CA0030023 for discharges of storm water associated with industrial activities and low-threat non-storm water discharges to surface waters.</p> <p>WDR Order No. 92-08-DWQ, NPDES General Permit No. CAS000002, Bldg. 132, Site ID No. 201S300881, DWTF Site ID No. 201S305140, and North Buffer Improvement Project Site ID No. 2015305529, for discharges of storm water associated with construction activities impacting 2 hectares or more.</p> <p>Four projects completed under Army Corps of Engineers Nationwide Permit and 401 Waiver of Water Quality Certification, 5 streambed alteration agreements.</p> <p>FFA, ground water investigation/remediation.</p>	<p>WDR Order No. 93-100 for post closure monitoring requirements for two Class I landfills.</p> <p>WDR Order No. 94-131, NPDES Permit No. CA0081396 for discharges of storm water associated with industrial activities and from cooling towers.</p> <p>WDR Order No. 96-248 (replaced WDR Order No. 85-188) for operation of two Class II surface impoundments, a domestic sewage lagoon, and percolation pits.</p> <p>WDR Order No. 91-052, NPDES Permit No. CA0082651 for discharges of treated ground water from the eastern General Services Area treatment unit.</p> <p>Two streambed alteration agreements. FFA ground water investigation/remediation. 52 registered, Class V injection wells.</p>
Hazardous waste	<p>ISD CA2890012584.</p> <p>Authorization to perform waste resin mixing in Unit CE231-1 and Unit CE443-1 under conditional exemption tier.</p>	<p>Part B CA2890090002—Building 883 and Explosives Waste Storage Facility.</p> <p>Docket HWCA 92/93-031.</p> <p>Open burning of explosives waste—pending.</p>
Sewer	Discharge Permit Nos. 1250 (96–97), 1508G (96–97), and 1510G (96–97) for discharges of wastewater to the sanitary sewer, discharges of sewerable ground water from TFF, and ground water discharges from restoration treatability studies (in order of numbers as indicated).	
Tanks	12 underground petroleum and hazardous waste storage tank permits.	One permit covering five underground petroleum product tanks.
Other	ACEHS medical waste permit for treatment and storage.	

^a Permit numbers are based on actual permitted units maintained and renewed by LLNL during 1996.

**Table 2-8.** Inspections and tours of LLNL facilities by external agencies in 1996.

Medium	Description	Agency	Date	Finding
Livermore site				
Air	Emission sources	BAAQMD	5/9 11/7 11/19 12/3 12/11	No violations
	Stack monitoring systems HEPA filter testing program Hazards Control Radiological Measurements Laboratory operations	EPA	5/28	No violations
Storm water/ streambeds	Wetlands management, streambed alteration	CDFG	1/9 8/27 10/8	No violations
	Streambed work	ACOE	6/20	No violations
	Streambed work, DWTF construction, Drainage Retention Basin and secondary containment at Building 519	SFBRWQCB	6/5 8/16 11/5	No violations
Tanks	Installation and closure of USTs	ACEHS	2/16 4/24 4/30 6/20 6/27 7/22 8/22 10/2	No violations
Waste	Three hazardous waste management facilities and one waste accumulation area	DTSC	2/14–2/15	No violations
	Medical waste	ACEHS	9/4	1 violation ^(a)
	Building 829 Open Burn Facility	DTSC	10/31	No violations
	Vehicles used for transporting hazardous materials	CHP	11/19–11/20	13 violations ^(b)
Wastewater	Building 391 large neutron-scintillating array pit	LWRP	8/2	No violations
	Compliance sampling	LWRP	10/2–10/3	No violations
	Wastewater sources	LWRP/EPA	10/17	No violations
	Ground water treatment facilities	LWRP	12/5	No violations
Site 300				
Air	Emission sources	SJVUAPCD	2/9	No violations
	Asbestos in buildings scheduled for demolition	SJVUAPCD	8/20	No violations
Storm water/ streambeds	Wetlands management, streambed alteration	CDFG	9/11	No violations
Waste	Vehicles used for transportation of hazardous material	CHP	12/10	5 violations ^(b)
Wastewater	Permitted operations	CVRWQCB	5/8	No violations

^a Storage above 0°C for longer than 7 days. See Chapter 2, Medical Waste.

^b Violations included such things as missing side reflectors, inoperative brake lamps, and a discharged fire extinguisher. See Chapter 2, Hazardous Waste Transport Registration.



Clean Air Act—Air Quality Management Activities

Air permits are obtained from the Bay Area Air Quality Management District (BAAQMD) for the Livermore site and from the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) for Site 300. In 1996, BAAQMD issued or renewed air permits for 194 air emission sources for the Livermore site. For 1996, SJVUAPCD issued or renewed air permits for 43 air emission sources for Site 300 (see **Table 2-7**). During 1996, air district inspectors found no deficiencies at either Site 300 or the Livermore site.

National Emission Standards for Hazardous Air Pollutants

Demonstration of compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclide emissions to air (Radionuclide NESHAPs, 40 CFR 61, Subpart H) requires that all potential sources be evaluated to determine the potential radiological dose to the maximally exposed individual (MEI) member of the public.

Compliance with two dose limits must be evaluated. First, the integrated dose to the MEI from all sources of radionuclide emissions to air at a site must not exceed 100 microsieverts per year ($\mu\text{Sv}/\text{y}$) (10 millirem per year [mrem/y]). Second, each source (stack) with the potential for unmitigated emissions resulting in any dose greater than 1 $\mu\text{Sv}/\text{y}$ (0.1 mrem/y) must be continuously monitored using systems that meet requirements stated in the regulations.

The *LLNL NESHAPs 1996 Annual Report* (Gallegos and Biermann 1997) reported to DOE and EPA the total calculated sitewide MEI radiological doses for the Livermore site and Site 300 to be 0.93 $\mu\text{Sv}/\text{y}$ (0.093 mrem/y) and 0.33 $\mu\text{Sv}/\text{y}$ (0.033 mrem/y), respectively. The reported doses include contributions from both point sources and diffuse sources. Modeling was based on a combination of effluent monitoring data and radionuclide inventory data. The totals are well below the 100 $\mu\text{Sv}/\text{y}$ (10 mrem/y) dose limits defined by the NESHAPs regulations. The details of these data are included in this report (see Chapter 12, Radiological Dose Assessment). These 1996 dose values are higher than those reported for 1995, which were 0.41 $\mu\text{Sv}/\text{y}$ (0.041 mrem/y) for the Livermore site and 0.23 $\mu\text{Sv}/\text{y}$ (0.023 mrem/y) for Site 300. There was one unplanned atmospheric radionuclide release from the Livermore site in 1996. The resulting dose to the sitewide maximally exposed individual was a minuscule 4.9×10^{-8} μSv (4.9×10^{-9} mrem). There were no unplanned atmospheric releases at Site 300 in 1996.

In 1996, LLNL maintained continuous radionuclide emissions monitoring of Building 331 (the Tritium Facility), Building 332 (the Plutonium Building), the seismically strengthened portion of Building 251, and six other buildings (see Chapter 12).



On May 28, 1996, the U.S. EPA, Region IX conducted a Compliance Evaluation Investigation at Buildings 332, 255, 253, and 331. LLNL personnel summarized stack monitoring systems, the HEPA filter testing program, the Hazards Control Radiological Measurements Laboratory operations, Building 332 operations overview and facility tour, and NESHAPs compliance overview. LLNL was found to be in compliance with 40 CFR 61 Subpart H, and no additional compliance activities were required.

On July 25, 1996, LLNL requested an exemption for uranium from the temperature-based physical state assumption that all materials heated in excess of 100°C are in a gaseous physical state. U.S. EPA accordingly granted approved alternative emissions factors for elemental uranium (see Chapter 12).

In December 1996, LLNL held an informational meeting with U.S. EPA Region IX staff to discuss planned construction of the Decontamination and Waste Treatment Facility at the Livermore site and Contained Firing Facility at Site 300. Potential NESHAPs issues and plans for monitoring at the facilities were discussed. Additional subjects covered at the meeting included periodic confirmatory measurements, the potential for the use of *de minimis* values in determining NESHAPs compliance, and the status of the delegation of NESHAPs regulatory oversight to the State of California.

Clean Water Act and Related State Programs

Preserving clean water is the subject of local, state, and federal regulations. The National Pollutant Discharge Elimination System (NPDES) under the Federal Clean Water Act establishes permit requirements for discharges into navigable waterways. In addition, the State of California requires permits, known as Waste Discharge Requirements (WDRs), for any discharges of wastes affecting the beneficial uses of waters of the state. The Regional Water Quality Control Boards (RWQCBs) are responsible for issuing and enforcing both permits. The Livermore Water Reclamation Plant (LWRP) requires permits for discharges of sewerable water to the city sanitary sewer system. The Army Corps of Engineers (ACOE) issues permits for work in navigable waterways below the normal high water mark and for controlling dredge and fill operations in waters of the United States. The State Water Resources Control Board (SWRCB) issues water quality certifications for this work if the Regional Water Quality Control Boards do not waive the requirement for the water quality certification. The California Department of Fish and Game (CDFG) under the Fish and Game Code Section 1601 et seq. requires streambed alteration agreements for any work that may disturb or impact rivers, streams, or lakes. Finally, the Safe Drinking Water Act (SWDA) requires registration and management of injection wells to protect ground water sources of drinking water. Water permits are summarized in **Table 2-7** and discussed in detail in Chapters 6, 7, and 8.



Ground Water and Surface Water

Discharges of treated ground water to surface water drainage courses and percolation ponds at LLNL are governed by NPDES permits, WDRs, and CERCLA Records of Decision (see **Table 2-7**). Details of surface water discharges are found in Chapter 7 of this report. Details of ground water monitoring are found in Chapter 8 of this report, the *LLNL Ground Water Project 1996 Annual Report* (Hoffman et al. 1997), and the LLNL Ground Water Project Quarterly Reports (McConachie and Brown 1996; Ko and Lamarre 1996; Littlejohn and Lamarre 1996; and Littlejohn and Lamarre 1997). LLNL discharges storm water associated with industrial activities, low-threat non-storm water, and various process waters discharging to surface impoundments and a sewer lagoon under NPDES permits and WDRs (see Chapters 7 and 8). LLNL was in compliance with its four NPDES permits and received no notices of violations (NOVs) in 1996. However, permit discharge limit excursions occurred in two of the four permits. NPDES discharges are summarized below in **Table 2-9**.

Table 2-9. Summary of discharges to surface water relative to NPDES permits.

Permit No.	Outfall	Nonconformance	Date(s) exceeded	Description—solution
CAS000002	Arroyo Las Positas (Livermore site)	DWTF: Non-permitted storm water discharge	1/96	Revised SWPPP ^(a)
CAS000002	Arroyo Las Positas (Livermore site)	NBZ ^(b) : Required inspection not performed	4/30	Revised SWPPP
CAS000002	Arroyo Las Positas (Livermore site)	NBZ: Required inspection not documented	5/7	Revised SWPPP
CA0030023	Arroyo Las Positas and Arroyo Seco (Livermore site)	none	none	none
CA0081396	Corral Hollow Creek (Site 300)	none	none	none
CA0082651	Corral Hollow Creek (Site 300)	TCE	8/21	Increased the retention time in the treatment system and cleaned the sparge tank.

^a SWPPP = Storm Water Pollution Prevention Plan.

^b NBZ = North Buffer Zone.

LLNL continued construction operations for two projects and started operations for one other project at the Livermore site, activities that are covered by the California General Construction Activity permit (see **Table 2-7**). Continuing operations included construction of Building 132 and the nonhazardous waste portions of the Decontamination and Waste Treatment Facility (DWTF). In 1996, LLNL submitted a Notice of Intent (NOI) to regrade 36 acres of the North Buffer Zone (NBZ) to improve drainage and maintenance.



In September 1996, the Central Valley RWQCB issued WDR Order No. 96-248 (amends WDR Order No. 85-188) for the operation of the domestic sewage ponds, the Class II surface impoundments, and five percolation pits at Site 300. On July 30, 1996, the Central Valley RWQCB waived waste discharge requirements for the operation of septic tanks and leach fields (previously permitted under WDR85-188) based on the finding that wastewater discharges to the septic tanks will not adversely affect water quality.

LLNL submitted a permit application to renew WDR Order No. 91-052 (NPDES Permit No. CA0082651) to the Central Valley RWQCB on February 7, 1996. The Central Valley RWQCB has not yet acted on this permit application.

In August 1996, the EPA awarded LLNL the national first place award for an excellent Storm Water Management Program in the Industrial Category. The National Storm Water Control Program Excellence Award acknowledges municipalities and industries that demonstrate their commitment to the protection and improvement of the nation's waters through the operation of innovative, cost-effective storm water control programs or projects. The selection was the result of an extensive national competition. EPA based the selection on LLNL's demonstrated innovative and cost-effective achievements for improving storm water quality.

Sewerable Water

The Livermore site's sanitary sewer discharges are sampled continuously, daily, weekly, and monthly to satisfy permit compliance requirements. The monitoring results for the LLNL effluent are reported monthly to the LWRP. In 1996, LLNL achieved greater than 99% compliance with LWRP permits covering discharges into the sanitary sewer. Although no NOV's were written for the sanitary sewer, two letters of concern (LOCs) were issued concerning pH excursions. In March 1997, LLNL was issued an NOV for a pH exceedance on February 12 and a silver exceedance on February 5. The NOV specifically targeted these two discharges, but treated the pH exceedance as a continuation of the low pH exceedances in 1996. LWRP permit exceedances are summarized in **Table 2-10** and discussed in detail in Chapter 6.

In 1996, LLNL continued to seek an EPA exemption from continued compliance with the Categorical Standards because of the belief that the categorical wastewater standards were not written or intended for research and development facilities. The LWRP suspended the requirements for self-monitoring of categorical processes through 1996 while the applicability of the categorical standards was evaluated. With the permit renewal of permit number 1250 (96-97), LWRP and EPA determined LLNL was not eligible for the exemption. However, the permit renewal resulted in a reduced number of processes subject to categorical requirements. Self-monitoring of these processes will begin in 1997 as required in the permit.



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Compliance Summary

Table 2-10. Summary of compliance with LWRP permit limits for discharges to the sanitary sewer.

Permit No.	Outfall	Exceedance	Date(s) exceeded	Description—solution
1250	City sewer	Low pH	1/31 3/22 8/12 8/26 9/11	Continue investigating for sources and provide enhanced education to the Laboratory's population regarding proper disposal of wastewater.
		High pH	5/17 6/3	Continue investigating for sources and provide enhanced education to the Laboratory's population regarding proper disposal of wastewater. ^(a)
		Mercury	11/27	Not applicable ^(b)
1508G	City sewer	none	none	none
1510G	City sewer	none	none	none

^a LWRP chose not to enforce these exceedances because they did not exceed the duration criteria of 40 CFR 401.17.

^b LWRP did not consider this exceedance a permit violation (see Chapter 6 for details).

LLNL renewed permits 1508G and 1510G issued by the LWRP for discharge of sewerable waste from TFF and for discharges from sitewide treatability studies. Discharges from TFF to the sanitary sewer are monitored quarterly and reported semiannually to the LWRP. Discharges from the sitewide treatability study are reported annually. These self-monitoring programs and the associated analytical results documenting compliance with the self-monitoring provisions of these permits are detailed in Chapter 6.

The LWRP toured the Building 391 large neutron-scintillating array pit on August 2, 1996, as part of their determination that it was appropriate to discharge ground water seeping into the pit to the sanitary sewer. On October 2 and 3, LWRP collected split samples of site effluent from Building 196 as part of the annual compliance sampling. The U.S. EPA and LWRP staff jointly inspected LLNL on October 17. This inspection was a follow-up to a series of inspections in 1995 that were part of the U.S. EPA's characterization of nondomestic wastewater sources, evaluation of whether source controls ensure compliance with the Clean Water Act, and review of the LWRP permit. EPA's conclusion was that LLNL was well operated and properly configured to comply with the Clean Water Act. LWRP staff additionally inspected the ground water treatment facilities on December 5, 1996. Results of EPA and LWRP inspections are summarized in **Table 2-8**.



Streambed Alteration Agreements and 404 Nationwide Permits

California Department of Fish and Game (CDFG) issued six streambed alteration agreements for construction and maintenance projects within arroyos near Livermore site facilities during 1996 (see **Table 2-11**). Four of these projects were also subject to Clean Water Act Section 404 permitting requirements and were covered by Army Corps of Engineers (ACOE) nationwide permits. The San Francisco Bay RWQCB issued waivers from 401 Water Quality Certification for each project covered by a nationwide permit.

Table 2-11. Summary of streambed alteration agreements and 404 nationwide permits.

Project	Location	Agency	Date submitted
Bank stabilization Erosion repair	Arroyo Seco	CDFG 401 waiver Nationwide permit 13	1/19/96 4/17/96 4/17/96
Bank stabilization	Arroyo Las Positas	401 waiver Nationwide permit 13	1/29/96 1/30/96
Maintenance	Arroyo Los Positas Arroyo Seco	CDFG	5/17/96
Channel maintenance Culvert removal	Arroyo Las Positas	CDFG 401 waiver Nationwide permit 13	7/22/96
Easement road crossing Culvert	Arroyo Mocho	CDFG 401 waiver Nationwide permit 14	8/5/96 8/2/96 8/2/96
Maintenance (5-year agreement)	Site 300 drainage culverts	CDFG	1995
Cutting vegetation	Arroyo Las Positas	CDFG	9/20/96

At Site 300, LLNL continued to operate under a 5-year CDFG streambed alteration agreement issued in 1995 for maintenance of drainage channels. CDFG issued a streambed alteration agreement on May 20, 1996, for the installation of monitor wells in the stream channel near Building 832. LLNL requested consultation with the Central Valley RWQCB, CDFG, and ACOE under CERCLA for remediation work impacting Elk Ravine as a result of remediation activities at the Building 834 complex.

Injection Wells

LLNL continues to operate injection wells registered with EPA. LLNL has 32 active and 20 inactive Class V injection wells at Site 300. The majority of the active injection wells are sanitary septic systems and percolation pits receiving small volumes of equipment wastewater, such as boiler blowdown and cooling tower blowdown.



Spill Prevention Control and Countermeasures Plan

LLNL's Spill Prevention Control and Countermeasures Plans (SPCC) for the Livermore site and Site 300 comply with the Federal Oil Pollution Prevention Regulation, Title 40, CFR Part 112 and Division 20, Chapter 6.67 of the California Health and Safety code. In addition, the Plans comply with 40 CFR 761.65(b) and (c), which regulates the storage of polychlorinated biphenyls (PCBs). LLNL first published the SPCC plan in November 1991. The plan was updated in December 1995 as required by 40 CFR 112.5, which requires that an SPCC Plan be amended whenever changes to a facility increase or decrease the possibility of oil being discharged into navigable waters. Since the publication of the original plan in November 1991, LLNL has decreased the possibility of a spill by improving its facilities. No significant changes were made to the technology or practices documented in the SPCC Plan. The revised plans were implemented in June 1996.

Tank Management

LLNL manages its underground storage tanks (USTs) and aboveground storage tanks (ASTs) through the use of underground tank permits, monitoring programs, operational plans, closure and leak documentation, the Tank Upgrade Project, remedial activities, and inspections. Those topics are discussed in the following sections.

Tank Systems

Underground tanks contain diesel fuel, gasoline, waste oil, and contaminated wastewater; aboveground tanks contain diesel fuel, insulating oil, TCE, and contaminated wastewater. Some of the wastewater systems are a combination of underground storage tanks and aboveground storage tanks. **Table 2-12** tabulates the status of the Livermore site and Site 300 tanks as of December 31, 1996. The number of USTs requiring tank operating permits during all or part of 1996 at the Livermore site decreased by 6.

Tank Integrity Testing

Under the tank leak-tightness testing program, single-walled hazardous waste and hazardous product USTs are tested to determine their structural integrity in accordance with requirements established in state and federal regulations. The Tank Upgrade Project has replaced all single-walled hazardous waste and hazardous product USTs with double-walled tanks that have continuous leak detection or double-walled ASTs. Therefore, tank integrity testing for USTs at the Livermore site and Site 300 is no longer needed.

**Table 2-12.** Status of in-service tanks, December 31, 1996.

Tank type	Livermore site			Site 300		
	Permitted	No permits required	Total	Permitted	No permits required	Total
Underground storage tanks						
Diesel fuel	7	0	7	4	0	4
Gasoline	2	0	2	1	0	1
Waste oil	1	0	1	0	0	0
Wastewater	2	38	40	0	10	10
Subtotal	12	38	50	5	10	15
Aboveground storage tanks						
Diesel fuel	0	26	26	0	15	15
Product	0	15	15	0	4	4
Wastewater	7 ^(a)	75	82	0	15	15
Subtotal	7	116	123	0	34	34
TOTAL	19	154	173	5	44	49

^a These seven tanks are located at the LLNL Treatment, Storage, and Disposal Facility and are operated under interim status as part of the RCRA Part B permit application.

Closure and Leak Documentation

Closure requirements for hazardous USTs include the preparation and approval of closure plans, quarterly reports if leaks have been identified, and a report upon completion of closure activities. The closure plans must include a detailed review of the uses of the tank, a sampling plan, a site plan, and other information to verify that no environmental contamination has occurred or, if it has occurred, to ensure its cleanup. Hazardous waste ASTs must also meet regulatory requirements for closure plans, field activities, and closure reports.

A total of eight closure plans were prepared in 1996 for tank systems (or portions of systems) that were taken out of service, previously removed (but not officially closed), or expected to be removed from service. Three of these closure plans were for regulated hazardous product, hazardous waste, or mixed waste USTs and were submitted to regulatory agencies. (A mixed waste UST stores waste that has the characteristics of both hazardous and radioactive waste.) All three closure plans have been approved. The five remaining closure plans were prepared for aboveground hazardous product and nonhazardous waste tank systems as a part of LLNL's best management practices.

Upon completion of closure activities, closure reports for hazardous product, hazardous waste, and mixed waste USTs must be submitted to the regulatory agencies for review



and approval. Ten closure reports for hazardous product, hazardous waste, or mixed waste USTs were submitted to regulatory agencies for review in 1996. Nine of these were approved, and the one remaining is awaiting approval. Eleven closure reports were prepared in 1996 for aboveground hazardous product and hazardous waste tanks as a part of LLNL's best management practices. Thirteen ASTs and seven USTs were closed during 1996.

Tank Upgrade Project

In 1992, LLNL began to upgrade or close wastewater retention tanks (for nonhazardous, hazardous, mixed, and radioactive waste) and product retention tanks (for petroleum products) in accordance with existing local, state, and federal tank regulations or to decrease the potential for environmental contamination as the result of a release from a tank or its appurtenances. As of December 1996, construction has been completed for 153 tanks and construction is in progress for 4 tanks.

Remedial Activities

In June 1996, during pipe removal activities associated with the closure of USTs 419-R1U4/R1U5, beads of elemental mercury were found underneath the floor of Building 419. Two of four samples that were collected and analyzed for metals and radioactivity showed mercury in quantities above the California hazardous waste total threshold limit concentration (TTL) limit. All soil samples showed tritium radioactivity, which was considered added radioactivity. The piping was removed and all the visible mercury-contaminated soil was excavated. DTSC and the Alameda County Department of Health Services agreed that no further excavation or sampling was necessary. The tritium contamination will be handled according to the *Record of Decision for the Lawrence Livermore National Laboratory Livermore Site* (U.S. Department of Energy 1992). Three source investigation piezometers have been installed downgradient of the west side of Building 419 to monitor any movement of the tritium contamination.

For every installation and closure of hazardous waste, mixed waste, and hazardous product USTs, there is an inspection in which a representative from Alameda County Environmental Health Services (ACEHS) (for the Livermore site) or San Joaquin County Public Health Services (for Site 300) participates. Inspections are summarized in **Table 2-8**.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) provides the framework at the federal level for regulating the generation and management of solid wastes, including



wastes designated as hazardous. Similarly, the California Hazardous Waste Control Act (HWCA) sets requirements for managing hazardous wastes in California. RCRA and HWCA also regulate hazardous waste treatment, storage, and disposal facilities, including permit requirements. Because RCRA program authorization was delegated to the State of California in 1992, LLNL now works solely with California Department of Toxic Substances Control (DTSC) on compliance issues and in obtaining hazardous waste permits.

Hazardous Waste Permits

The Livermore site hazardous waste storage and treatment management units continued to operate under interim status provisions (ISD CA2890012584) while DTSC continued to review and consider the latest modification to the Livermore site Part B permit application. Waste management units include container storage, tank storage, and various treatment processes (e.g., wastewater filtration, blending, and size reduction).

LLNL submitted a revised Part B application on June 28, 1996. This application includes some existing hazardous waste facilities as well as the proposed Decontamination and Waste Treatment Facility (DWTF). The DWTF will be constructed in order to consolidate, replace, upgrade, and augment existing LLNL waste management capabilities. The revised Part B application, if approved by DTSC, will provide a mechanism for LLNL to operate portions of the existing hazardous waste facilities under interim status until DWTF is permitted and fully functional. The remaining portion of existing facilities will continue to operate under the Part B permit. A revised Health Risk Assessment was developed to supplement the Part B application and was submitted to DTSC in February 1997.

The Site 300 Building 883 hazardous-waste-container storage area operates under the provisions of the Part B permit (Part B CA28990090002) issued by DTSC in November 1989 and renewed in May 1996. The renewed permit also authorized the construction and operation of the Explosives Waste Storage Facility, which augments the storage capability at Site 300 by providing a separate dedicated facility to store explosives waste. It is anticipated that this facility will be operational in July 1997.

A new, open-burning, open-detonation facility called the Explosives Waste Treatment Facility (EWTF) was proposed for Site 300. The proposed facility will replace the existing Building 829 Open Burn Facility. A Part B permit application for the proposed EWTF was submitted to DTSC in May 1993 and last revised in September 1995. The Part B application was supplemented by an Environmental and Exposure Assessment (EEA) submitted in May 1993 and last revised in September 1996. LLNL anticipates issuance of the EWTF permit in fiscal year 1997.



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The Building 829 Open Burn Facility for explosives waste continues to operate under a stipulation order issued by DTSC in September 1993. Upon issuance of the EWTF permit, the Building 829 Open Burn Facility will undergo formal interim status closure, pending approval of the closure plan by DTSC. A closure plan was submitted to DTSC in July 1993, and a revised plan submitted to DTSC in April 1997. The closure will involve removal of all equipment and capping and grading of the area, in compliance with regulatory requirements for in-situ closure of a hazardous waste unit.

On February 14 and 15, 1996, DTSC Region 2 conducted a Compliance Evaluation Inspection at the Livermore site.

DTSC reviewed the following types of records and documents: inspection logs, hazardous waste manifests, land disposal restriction notifications, stored waste inventory, hazardous waste container tracking system, hazardous waste hauling license, interim status document, hazardous waste facility operating logs, two conditionally exempt resin mixing treatment unit operating logs, contingency plans, training records, Hazardous Waste Management Waste Analysis Plan, engineering certifications for HWM tanks, and closure plans. No violations were issued (see **Table 2-8**).

Hazardous Waste Reports for 1995 and 1996

Biennial reports, *Hazardous Waste Report—Mainsite* and *Hazardous Waste Report—Site 300*, are required under 40 CFR 262.41, 264.75, and 265.75. These reports were completed and delivered to EPA on March 29, 1996, by the adjusted deadline. The corresponding annual reports, which cover 1996 waste-handling information, will be completed and submitted to meet DTSC's adjusted June 30, 1997, deadline. The annual reports are required under 22 CCR 66264.75 and are on file at LLNL.

Hazardous Waste Transport Registration

Transportation of hazardous waste over public roads (e.g., from one LLNL site to another) requires DTSC registration (22 CCR 66263.10). Conditions for registration include annual inspections of transport vehicles and trailers by the California Highway Patrol (CHP), biennial terminal inspections, special training and annual physical examinations for drivers, and annual submission of lists of transport vehicles and trailers to DTSC. The registration was renewed by DTSC in November 1996.

The California Highway Patrol inspected the Livermore site and Site 300 on November 19–20 and December 10, 1996, respectively. As part of the November vehicle safety compliance check, eight vehicles assigned to the Livermore site were inspected. Twelve violations were identified on five vehicles that may transport hazardous material. An additional citation was issued for a vehicle recordkeeping violation. The December inspection was conducted at LLNL's Site 300 and included a total of eight additional



vehicles. Site 300 received five violations involving four vehicles that may carry hazardous material. All but two of the violations have been corrected. The remaining deficiencies involve driver time-keeping records and vehicle marking issues. Current LLNL policies are being modified to address these final findings.

A certificate commending LLNL for three consecutive satisfactory safety compliance ratings since January 7, 1992, was awarded to LLNL at the conclusion of this inspection.

Waste Accumulation Areas

Beginning in January 1996, there were 41 waste accumulation areas (WAAs) at the Livermore site and one at the Livermore Airport. During the year, 4 WAAs were taken out of service and 1 WAA was put into service, leaving a total of 38 WAAs at the Livermore site and 1 WAA at the Livermore Airport. Program representatives conducted formal inspections at least weekly at all WAAs to ensure that WAAs were operated in compliance with regulatory requirements. More than 2100 formal WAA inspections were conducted at the Livermore site and 52 at the Livermore Airport WAA. In addition, Environmental Protection Department (EPD) personnel conducted informal, biweekly, routine checks at all WAAs for such things as capacity, labeling, and secondary containment to help ensure that programs managed their WAAs and wastes in compliance with state and federal requirements. EPD personnel performed 1028 biweekly WAA walkthroughs at the Livermore site and 24 biweekly WAA walkthroughs at the Livermore Airport during 1996.

At the beginning of 1996, there were two WAAs at Site 300. During the year, two WAAs were taken out of service and two WAAs were put into service, leaving a total of two WAAs at Site 300. EPD personnel performed 51 biweekly WAA walkthroughs at Site 300 during 1996.

Medical Waste

LLNL generates several types of medical wastes (previously identified as infectious wastes). In July 1991, LLNL registered with the Alameda County Environmental Health Services (ACEHS) as a large-quantity generator of medical waste and submitted an application for a medical-waste treatment permit for the Livermore site. Site 300 is a small-quantity generator and is therefore exempt from medical-waste registration.

The Livermore site generator registration and treatment application contained detailed information concerning the management and treatment of medical wastes generated by LLNL's Biology and Biotechnology Research Program, Forensic Science Center, Medical Photonics Laboratory, and Health Services facilities. The registration (No. M71049 B-1)



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for medical waste generation is issued annually and is currently valid through July 1997. The treatment permit (No. M71049 C) for on-site steam sterilization, originally issued in August 1991, was renewed in August 1996 and is valid through July 2001.

During an inspection of LLNL's medical waste generator and treatment facilities on September 4, 1996, an ACEHS inspector issued one report of violation to LLNL's Health Services Department for storing a small amount of medical waste (cotton swabs, bandages, and gauze pads) longer than the maximum 7 days above 0°C. Immediately after the violation was received, a self-assessment of medical waste compliance was conducted, additional training was provided, and revised medical-waste management procedures were implemented. These corrective actions were reported to ACEHS in a letter dated October 3, 1996.

Building Inspections

Formal, detailed building inspections for each LLNL facility are conducted based on a schedule established by the Facility Manager and the appropriate Environmental, Safety, and Health (ES&H) Team. The ES&H Teams are made up of environmental, safety, and health discipline specialists who assist LLNL in maintaining compliance with ES&H requirements.

The inspections scrutinize handling and management of hazardous and radioactive wastes and waste streams; management and maintenance of WAAs; potential release pathways to the environment (e.g., storm and sanitary-sewer drains and air); hazardous product storage areas; wastewater retention tank systems; operating equipment (e.g., vacuum pumps, transformers, capacitors, and baghouses); and laboratory and machine shop areas. An inspection report is prepared for a program or department, and follow-up checks are conducted to ensure implementation of recommendations or corrections. During 1996, the ES&H teams conducted 160 formal building inspections at the Livermore site. At Site 300, the team conducted 28 formal building inspections. Building inspections include buildings, trailers, and tents. EPD conducted 11 audits of HWM facilities at the Livermore site and 10 audits of the HWM container storage facility at Site 300. Informal walkthrough inspections are conducted on an as-needed basis.

Site Evaluations Prior to Construction

Soil and debris from construction sites are evaluated for reuse and disposal. Rubble may be surveyed for radioactivity or analyzed, depending on the outcome of the



evaluation. The soil is sampled and analyzed for potential radioactive or hazardous contamination. Soil is reused when possible (depending on analytical results) or disposed of according to established procedures. During 1996, environmental analysts conducted preconstruction site evaluations for 76 construction projects.

Federal Facility Compliance Act

In 1995 and 1996, the DOE negotiated terms of a Site Treatment Plan (STP) for management of mixed waste at LLNL with DTSC. DTSC assessed the potential environmental impacts associated with this action under the California Environmental Quality Act (CEQA) and issued a CEQA initial study, a draft Negative Declaration and proposed site treatment plan for public comment starting September 24, 1996. The final STP was approved in February 1997.

Toxic Substances Control Act

In August 1996, DOE, EPA, and the U.S. Naval Nuclear Propulsion Program signed a National Federal Facility Compliance Agreement to address the storage and treatment of radiological waste containing PCBs. LLNL will comply with the terms of this agreement, which requires DOE to submit annual reports on the status of this waste.

National Environmental Policy Act

The National Environmental Policy Act (NEPA—42 U.S.C. 4321 et seq.) established federal policy for protecting environmental quality. The major method for achieving established NEPA goals is the requirement for preparing an Environmental Impact Statement (EIS) for any major federal or federally funded project that may have significant impact on the quality of the human environment. If the need for an EIS is not clear, or if the project does not meet DOE's criteria for requiring an EIS, an Environmental Assessment (EA) is prepared. A finding of no significant impact (FONSI) is issued when the EIS is determined to be unnecessary.

Certain groups of actions that do not have a significant effect on the environment either individually or cumulatively can be categorically excluded from a more in-depth NEPA review (i.e., preparation of either an EA or EIS). DOE NEPA implementing procedures (57 FR 15122), as changed in 1996 (61 FR 36222), identify those categorical exclusions and the eligibility criteria for their application. If a proposed project does not clearly fit one of



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the exclusion categories, DOE determines which type of assessment document may be needed. During 1996, 23 categorical exclusions were submitted to and approved by DOE.

Environmental Assessments

In 1996, DOE issued FONSI for EAs of the proposed Decontamination and Waste Treatment Facility (DWTF) and the Explosives Waste Treatment Facility (EWTF).

DOE also issued a Record of Decision (ROD) in December 1996 for a Final Programmatic Environmental Impact Statement (PEIS) for Stockpile Stewardship and Management (SSM). This PEIS contained project-specific NEPA analyses for the National Ignition Facility (NIF) (SSM, App. I) and the Contained Firing Facility (CFF) (SSM PEIS, App. J) for which the ROD served as the final NEPA review determination. Both were noted in the ROD as facilities to be constructed and operated at LLNL.

Floodplain Management and Wetland Protection

In 1996, there were no proposed actions at LLNL that required separate DOE floodplain or wetlands assessments.

California Environmental Quality Act

No Initial Study or Environmental Impact Report (EIR) documents were completed by the University of California (UC) in 1996 on proposed projects at LLNL for which UC was the principal decision-making (lead) agency.

In November 1992, UC and LLNL made a commitment to implement 67 mitigation measures identified by the *1992 Final Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore* (U.S. Department of Energy and University of California 1992a and b) and to provide annual reports on their implementation. The measures are being implemented in accordance with the approved 1992 Mitigation Monitoring and Reporting Program associated with that EIS/EIR. The fiscal year 1995 annual report was published in April 1997; the next annual report will cover fiscal year 1996 activities.

National Historic Preservation Act

The National Historic Preservation Act (NHPA), as amended through 1992, requires federally operated and funded installations such as LLNL to balance agency missions with cultural values by integrating historic preservation into federal agency programs.



Federal agencies must take into account the effects their projects may have on “historic properties” (cultural resources), and they must allow a reasonable time period for the Advisory Council on Historic Preservation (the Council) to comment.

In 1996, LLNL continued to assist DOE’s Oakland Field Office in its consultations with the California State Historic Preservation Office and the Council to develop terms of a Programmatic Agreement to help LLNL resolve short term compliance issues and to develop a Cultural Resource Management Plan (CRMP). Final review and comment by the two agencies and the public in order to fulfill and complete the consultation process as required by NHPA regulations is expected in 1997. Examples of activities performed in 1996 while awaiting final approval of the Programmatic Agreement include the following:

- Continued work to prepare a survey report on the Site 300 Annual Fire Trail Grading Project to comply with Section 106 of the NHPA. Eight isolated finds and three previously identified cultural resources, now redefined archaeological sites, were located as a result of the survey. The isolated finds and sites are all historic and pertain to the Corral Hollow Industrial Period of 1858–1918 and the Carnegie Town and Manufacturing site. In addition, the isolated finds and the Carnegie Town site will be evaluated for significance, according to Section 106 requirements of the NHPA, in order to determine whether the project impacts the significance of the identified cultural resources.
- Continued participation in public outreach programs such as making presentations to schools and local groups (e.g., historical societies and service organizations) about cultural resources within the LLNL area.

Endangered Species Acts and Sensitive Natural Resources

LLNL must meet the requirements of both the U.S. Endangered Species Act and the California Endangered Species Act as they pertain to endangered or threatened species and other species of special concern that may exist or are known to exist at the LLNL sites. For example, in implementing the Mitigation Monitoring and Reporting Program in 1996, biological assessment surveys were performed for special-status species at 67 LLNL project construction (ground disturbance) areas. Presence data for the San Joaquin kit fox (*Vulpes macrotis mutica*), American badger (*Taxidea taxus*), and burrowing owl (*Speotyto cunicularia*) were collected at each project location, and other applicable mitigation measures were implemented when required.



2

Compliance Summary

During 1996, no active San Joaquin kit fox dens were discovered, but three potential dens were found. Fifteen occupied American badger dens were discovered, and four unoccupied dens were identified. Twelve active burrowing owl dens were discovered (four at the Livermore site and eight at Site 300), and two potential dens were identified. In addition, two new populations of the federally listed red-legged frog (*Rana aurora draytonii*) and the federal candidate species California tiger salamander (*Ambystoma tigrinum*) were found at wetlands locations at Site 300. One new population of California tiger salamander was observed at the LLNL Treatment Facility discharge point at SNL/California. One special-status animal species, the red-shouldered hawk (*Buteo lineatus*), not previously known to occur on LLNL property, nested at the Livermore site in 1996.

Two of the three known natural populations of the large-flowered fiddleneck (*Amsinckia grandiflora*), a federally listed endangered plant species, occur at Site 300. A portion of Site 300 has been designated as critical habitat for the plant. Between 1992 and 1995, LLNL investigators established new experimental populations of the large-flowered fiddleneck at Site 300, and attempted to determine the causes of the species decline. The scientists were successful in establishing one new experimental population of the plant at Site 300. In 1996, it was found that the numbers of fiddleneck plants had increased owing to the reduction of exotic grass cover.

Environmental Occurrences

Notification of environmental occurrences is required under a number of environmental laws, regulations, and the 5000 series of DOE Orders including DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, and DOE Order 5484.1, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements*. Effective February 22, 1993, DOE Order 5000.3B provided guidelines to contractor facilities regarding categorization and reporting of environmental occurrences to DOE. The Order divided occurrences into three categories: emergencies, unusual occurrences, and off-normal. On August 8, 1996, DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information*, was accepted by the UC Regents, thus replacing DOE Order 5000.3B. DOE Order 232.1 divides occurrences into two categories: unusual and off-normal occurrences. This Order refers to DOE Order 151.1, *Comprehensive Emergency Management System*, for the categorization of all emergencies. However, the UC Regents have not accepted DOE Order 151.1; thus, all emergency categorizations are determined using the 5500 series DOE Orders.

The Environmental Protection Department responded to 14 incidents that required regulatory agency notification during 1996. The EPD response to environmental



occurrences is part of the larger LLNL On-Site Emergency Response Organization that also includes representatives from Hazards Control, Health Services, Plant Engineering, Public Affairs, Safeguards and Security, and Site 300. All fourteen of the incidents were categorized as off-normal occurrences according to either DOE Order 5000.3B or DOE Order 232.1 implementing procedures. None of the incidents, summarized in **Table 2-13**, caused any adverse impact to human health or the environment. Agencies notified of these incidents included DOE, Alameda County Health Care Services Agency, San Joaquin County Public Health Services, San Francisco Bay RWQCB, Central Valley RWQCB, Office of Emergency Services, and DTSC.

Table 2-13. Tabulation of environmental occurrences reported under the Occurrence Reporting System, 1996.

Date ^(a)	Occurrence category	Description
Jan 5	Off-Normal	A manifest was returned from an off-site treatment, storage, and disposal facility (TSDF) in 49 days instead of the required 45-day regulatory requirement. An Exception Report was submitted to the state. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.
Jan 19	Off-Normal	Fuming nitric acid was accidentally discharged in the High Bay in Building 431 when shipping boxes containing ten 1-L bottles of fuming nitric acid ignited (possibly because of acid leakage from one or more of the bottles onto the cardboard). The ensuing combustion heated, melted, and shattered the remaining bottles of acid. Approximately 1500 gal (5682 L) of contaminated sprinkler water used to douse the fire was discharged to the ground via the gravel pit. The release was reported, under the requirements of the business plan, to the OES and to the San Francisco Bay RWQCB as required in NPDES permit CA0030023, WDR 95-174. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.
April 9	Off-Normal	Approximately 11,000 gal (42,000 L) of potable water were discharged because of a leak in a 10-in. water main in the vicinity of the DWTF construction area. The release was reported to the San Francisco Bay RWQCB as required in NPDES Permit CA0030023, WDR 95-174. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.
May 24	Off-Normal	Because of a malfunctioning pump, which normally automatically pumps the contents of the Building 817 retention tank to the surface impoundments, the tank overflowed onto the ground from the top access port. The discharge flowed off the concrete retention tank pad and percolated into the ground. The majority of the wastewater in the tank at the time of the discharge was cooling water used to cool another pump in the 817 complex. The discharge of untreated wastewater was reported to the Central Valley RWQCB as required in WDR 85-188. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.
June 11	Off-Normal	During activities associated with the closure of Building 865, wood pallets used to store lead shot and brick at the Building 865 corp yard were transported to Salvage. Soil samples were obtained from the corp yard to determine if lead had contaminated soil beneath the pallets. Results indicated that surface samples were contaminated to 12 mg/L based on the soluble threshold limit concentration (STLC), and 120 mg/kg based on the total threshold limit concentration (TTLC). Soil at 1.5 ft was below detection for STLC. The CERCLA reportable quantity for lead is 10 lb. The quantity of lead in the soil exceeded half of the CERCLA reportable quantity, meeting the requirements of an Off-Normal Occurrence.



2

Compliance Summary

Table 2-13. Tabulation of environmental occurrences reported under the Occurrence Reporting System, 1996 (continued).

Date ^(a)	Occurrence category	Description
June 20	Off-Normal	Approval was received from Alameda County to close the piping associated with underground storage tank 419-R1U4/R1U5, which was located underneath Room 167 of Building 419. An LLNL sampling technician was beginning to excavate underneath the piping to collect soil samples when he observed that there were small beads of elemental mercury in the first shovel of soil. A small portion of the soil was removed to assess the extent of the contamination and to remove the mercury. During this excavation, additional elemental mercury was discovered. The Alameda County Health Care Services Agency was notified of the release. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.
June 21	Off-Normal	A drum being returned to LLNL containing solidified depleted uranium, D-38, and turnings shipped from SEG Inc., exceeded the certification ratings for Department of Transportation shipping requirements. Evidence of improper selection or assembly of a hazardous material package off site meets the requirements of an Off-Normal Occurrence.
Aug 22	Off-Normal	Two 5-gal (19-L) containers of waste described as non-RCRA formaldehyde, pH 4–7 were shipped to ENSCO. ENSCO notified LLNL that both containers had a pH <2 upon receipt. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section.
Aug 25	Off-Normal	During a routine QA record review by LLNL personnel, it was discovered that an ignitable solid waste was transported to ENSCO West Disposal facility as an ignitable liquid waste. The ENSCO facility was able to accept ignitable solids and the waste was not returned to LLNL. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section.
Sept 5	Off-Normal	During a County Medical Waste inspection, Health Services received a notice of violation (NOV) for storing medical waste for over 7 days above 0°C on at least two occasions. This violation was discovered during a record review by the regulator during an inspection. Receipt of an NOV meets the requirements of an Off-Normal Occurrence.
Sept 25	Off-Normal	A waste container holding corrosive material was inadvertently shipped to an off-site treatment facility with improper classification during a loading operation. When it became known that the container was loaded on the vehicle, the transporter was notified. The driver corrected his manifest. Errors made by the shipper in material descriptions meet the requirements of an Off-Normal Occurrence under the Transportation Section.
Sept 26	Off-Normal	During a routine maintenance operation, the LLNL Pipe Shop Crew discovered some mercury in the storm drain catch basin adjacent to Building 253. Using a mercury sniffer, it was determined that mercury was present in 8 of the 10 catch basins in the immediate vicinity. Any detection of a hazardous material in a storm sewer where the amount is unrepresentative of natural levels for LLNL meets the requirements of an Off-Normal Occurrence.
Oct 17	Off-Normal	Approximately 88,000 gal (333,000 L) of swimming pool water were discharged to the ground because of a leak in the swimming pool at the Livermore site. The leak was repaired during the week of September 26, 1996. The release was reported to the San Francisco Bay RWQCB as required in NPDES permit CA0030023, WDR 95-174. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.



Table 2-13. Tabulation of environmental occurrences reported under the Occurrence Reporting System, 1996 (concluded).

Date ^(a)	Occurrence category	Description
Nov 16	Off-Normal	Approximately 1000 gal (3800 L) of sewage were discharged to the ground because of an overflowing sewage manhole adjacent to Building 298. Rags and debris had clogged the stationary sewage monitoring equipment and restricted its flow, thus causing the overflow. The release was reported to the San Francisco Bay RWQCB as required in NPDES permit CA0030023, WDR 95-174. A written report to outside agencies in a nonroutine format meets the requirements for an Off-Normal Occurrence.

^a The date indicated is the date the occurrence is categorized, not the date of its discovery.

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